ABSTRACT:

St. Louis Bay, along with its two major tributaries, Wolf River and Jourdan River, are included in the Mississippi 1998 Section 303(d) List for violation of the designated water use of recreation and shellfish harvesting. Fecal coliform was identified as one of the pollutants that caused the water quality impairment. In order to facilitate the total maximum daily loads (TMDL) development, the fecal coliform dynamics was investigated under 2 flow scenarios with a calibrated and validated modeling framework by integration of Environmental Fluid Dynamic Code (EFDC) and Hydrological Simulation Program Fortran (HSPF). EFDC was used to model the hydrodymics and fecal coliform transportation in the Bay and the tributaries, whereas HSPF was applied to compute the flow and fecal coliform loadings from the watersheds. The total amount of precipitation in the dry year simulation corresponds to a 50-year return period of low flow condition, and a 10-year return period of high flow condition for wet weather simulation. For EFDC modeling, the fecal coliform sources considered were the contributions from the 2 upper watersheds (no tidal influence), the 28 small surrounding watershed, and 12 municipal, industrial, and domestic point sources. When simulating the fecal coliform loadings from the 2 upper watersheds using HSPF, the simulated non-point source loadings of fecal coliform included wildlife, land application of hog and cattle manure, land application of poultry litter, and grazing animals. The EFDC modeling results indicated that the wet weather exerted greater stress on fecal coliform water quality conditions. The number of exceedance of fecal coliform water quality standard in wet year simulation is much higher than that in dry year simulation. The impact of the upper rural watersheds loads on fecal coliform levels in the St. Louis Bay is much less significant than that from the surrounding urban runoff. Fecal coliform TMDL development should be based on high flow conditions since the decision makers are more concerned about worse scenarios. This fecal coliform modeling research would provide useful information of critical condition selection for TMDLs development in similar coastal areas.